EMLINK 1

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User Manual

Issue 1.0

Emlink1 Programming

Output Channels 1 & 2 - Relay Test

The Emlink1 has a build in relay test function. When the output and signal LED's 5 & 6 are flashing, pressing the right switch will turn on the outputs relay and signal LED 1.

Tamper Output / 3rd Channel - Overview

The tamper channel can work as a tamper relay or a third channel. Pairing the tamper channel to any local or remote tamper functions automatically configures the third channel's output into tamper mode. In tamper mode the relay is permanently energised while no tamper fault has been detected. This is a fail safe system to prevent a power failure not showing a tamper fault. Setting any of the following will configure the third channel as a tamper channel:

1) Enable local tamper switch
2) Enable missing status updates
3) Pair any remote Emlink1's tamper channel.

It is also possible to pair a standard input from a remote Emlink1 to the tamper channel. A standard input from a remote Emlink1 will not switch the third channel into a tamper channel but it can be used as another tamper input. When a remote input is being used on a tamper channel, triggering the input will switch off the tamper relay, i.e. the signal is inverted. This can be a useful feature if you wish to report back a remote tamper state from a bell box or PIR etc.

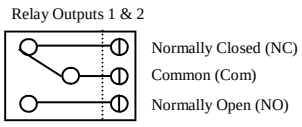
If none of the above have been enabled or paired, the tamper relay will work as a third channel. In this mode the normal state is 'Normally Open'. The only supported mode for this channel is momentarily.

Note: When the local tamper switch is disabled, its status is still transmitted to other Emlink1 devices.

Hardware Description

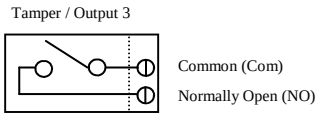
Outputs 1 & 2

Both outputs are volt free with normally open, normally closed contacts and are capable of switching loads of up to 1A @ 30V. Under software control these outputs can be configured to work in either momentary, toggle or timer mode. The electrical connections are as follows:



Output 3 / Tamper Relay

Output 3 has volt free contacts and can switch up to 500mA @ 30V. This output can be configured to work as either a tamper circuit (Energised normally closed) or a third channel (Normally open) Please refer to the programming section to configure this output. The electrical connections are as follows:



Power Supplies

The Emlink1 works from a 9 - 24V(Max) DC power supply. The use of a regulated or unregulated DC power supply is permitted providing the voltage does NOT exceed 24V DC (An unregulated 24V DC power supply will produce a higher voltage than 24V and will cause damage to the Emlink1). The Emlink1 is also reverse polarity protected. If using a separate power supply to drive the inputs please ensure the 0V connections are common-ed up

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5) **Hardware Description**

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Specifications

Electrical	
Operating voltage	9 - 24V DC (Max)
Operating current (Idle)	25mA (Max)
Operating current (All Relays & LED's)	85mA (Max)
Relays Max working voltage	30V AC / DC
Relay contact type	Volt Free
Relay 1 & 2 Max current	1A
Relay 3 / tamper relay max current	500mA
Input 1 & 2 voltage	25V (Max)
Input 1 & 2 resistance	11.2K Ohms
Radio	
Operating frequencies	433.32 - 434.52MHz
Transmit power	<= 10mW
Radio data Rate	19.04 KHz
Deviation	20KHz (SSB)
Bandwidth	40KHz (SSB)
Data Channel (Only on certain models)	
Interface type	RS232 or RS485
Baud rate	2400 - 19200
Protocols	Emlink, Pelco P & D
Mechanical	
Case size without aerial and grommet	115 x 65 x 40mm
Overall size with aerial and grommet	305 x 65 x 40mm
Case rating	IP65
Environmental	
Temperature range	- 10 to + 70 Degrees
Relative humidity	95% non - condensing

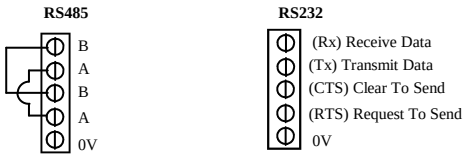
Hardware Description

RS232 / RS485 Data Channel

On certain models of the Emlink1, a data channel with either RS232 or RS485 is supported. Serial baud rates from 2400 to 19200 are possible with none, odd or even parity. Supported protocols are: Pelco D & P, Emlink and an open channel. An easy way to identify between a RS232 or a RS485 version is to look at the last digit of the units serial number:

R: RS232 Supported
N: Network RS485 Supported

The electrical connections for both the RS232 and RS485 are listed below:



Aerial Connector

A threaded M4 connector for mounting of the rubber duck aerial. Please ensure the aerial has its supplied rubber washer fitted between the case and aerial and that the aerial is done up hand tight to create a waterproof seal. If the washer is not fitted or the aerial is loose possible water damage may occur which is not covered under the product guarantee.

Programming Connector

The programming connector is for firmware upgrades and PC configuration of the Emlink1. Do not connect anything to this connector other than the recommended programming tool. Please contact your supplier for purchase information on the PC configuration / programming tool if required.

Emlink1 Programming

Output Channels 1 & 2 - Operational Modes

The Emlink1 outputs can operate in 3 modes, Momentarily, Toggle or Timer

1) Momentarily means if any paired input is triggered the relay output is switched on.
2) Toggle mode will cause its output to flip on detection of any positive going signal from a paired device.
3) In timed mode any positive going signal from a paired device will either start the timer or reset the timer period to the beginning.

Output Mode	Flashing LED's	Static LED's
Momentarily	Output x + Signal LED 6	Signal LED 1
Toggle	Output x + Signal LED 6	Signal LED 2
Timer	Output x + Signal LED 6	Signal LED 3

Note: Output x = Output LED 1 or 2

Output Channels 1 & 2 - Timer Periods

The Emlink1 allows various time periods per channel from 1 second to 30 minutes. Listed below is the various timer periods.

Output Mode	Flashing LED's	Static LED's
1 Second	Output x + Signal LED 5	Signal LED 1
5 Seconds	Output x + Signal LED 5	Signal LED 2
10 Seconds	Output x + Signal LED 5	Signal LED 3
30 Seconds	Output x + Signal LED 5	Signal LED 4
1 Minute	Output x + Signal LED 5	Signal LED's 1 & 4
15 Minutes	Output x + Signal LED 5	Signal LED's 2 & 4
30 Minutes	Output x + Signal LED 5	Signal LED's 3 & 4

Note: Output x = Output LED 1 or 2

Emlink1 Programming

Restore Factory Settings

This option resets the Emlink1 back to factory default and erases any previously paired devices. When selected all of the status LED's will flash together

To reset the Emlink1, hold down the right switch and wait for the signal LED's to increment from 1 to 6, this is a warning stating all settings are about to be erased. When the 6th LED is on there will be a short pause followed by the Emlink1 flashing all its LED's before rebooting.

Once the Emlink1 has rebooted it will have restored its factory defaults and erased any previously paired devices.

Main Features

- Repeat mode
- 7 RF channels
- Site Survey mode
- Easy Pairing Menu
- Encrypted protocol
- 12 - 24V DC operation
- 433MHz licence free
- Signal Strength Meter
- 1KM Range (Line of sight)
- 3 x Volt Free Relay Outputs
- 2 x Analogue / Digital Inputs
- RS232 / RS485 Data Channel
- IP65 (All Weather) Rated Enclosure
- Momentary, Toggle & Timer outputs
- Emlink, Pelco (D & P) and open protocols
- Timer outputs from 1 second to 30 minutes
- Internal Input to Output Pairing (For timer function)
- Missing Status Update Monitoring (Signal Jamming)

Emlink1 Programming

Input Channels 1 & 2 - Internal Input To Output Pairing

The Emlink1 has an option to pair its own input to its own output. One good reason for doing this is to use the Emlink1 as a timer but still transmit its status to other units. You can only pair input 1 to output 1 or input 2 to output 2.
The option are:

Input / Output Pair	Flashing LED's	Static LED's
Input / Output Enabled	Input x + Signal LED 5	Signal LED 1 On
Input ./ Output Disabled	Input x + Signal LED 5	Signal LED 1 Off

Note: Input x = Input 1 or 2

Output Channels 1 & 2 - Pairing

In this mode the Emlink1 accepts a pairing signal from another Emlink1. Only inputs can be paired to an output unless the data channel has been configured for either the pelco or Emlink protocol. For each new paired device (up to 5 units per channel) the signal LED's 1 - 5 increment. Holding down the right switch for over 3 seconds clears any previously paired devices on the currently selected output. .

To pair a Pelco Aux command to an output, insure that Pelco is already configured before entering configuration mode. Press the Aux channel you wish to pair on the Pelco interface and the Emlink1 will learn its address and Aux channel.

Pair Outputs 1 or 2	Flashing LED's	Static LED's
1 device paired	Output x LED only	Signal LED 1
2 devices paired	Output x LED only	Signal LED 2
3 devices paired	Output x LED only	Signal LED 3
4 devices paired	Output x LED only	Signal LED 4
5 devices paired	Output x LED only	Signal LED 5

Note: Output x = Output LED 1 or 2

Basic Functions

While the Emlink1 is in normal operation the 3 PCB switches have some engineer friendly features listed below:

Site Survey Mode

This mode sends out a beacon signal every second to assist the engineer in finding an ideal location for installing the Emlink1. You should aim for a minimum of 2 - 3 bars of signal strength for a reliable link.

By pressing switches 1 & 2 together for a brief second the Emlink1 enters 'Site Survey' mode. Site Survey mode only sends out a beacon signal and does not control any of the Emlink1's outputs. To exit this mode, again press switches 1 & 2 for a brief second or replace the box cover for 5 seconds.

It is only advisable to enter one unit into site survey mode at any particular time.

Channel 1 or 2 Input Test

Holding down either switch 1 or 2 for half a second sends the corresponding channel 'ON' signal. Any receiving device paired to this channel will activate its corresponding outputs. Again this is useful for a engineer to check a channel is working correctly.

Tamper switch

By holding the tamper switch down for 5 seconds this simulates the box lid being closed and switches off all of the internal status LED's. The Emlink1 will also send a status packet on the tamper switch changing state. There is also a 1 second delay when you release the tamper switch before the status LED's become active. Holding down the tamper switch while in configuration mode for 5 seconds exits configuration mode without saving any new changes.

General Description

The Emlink1 is a full featured 433MHz wireless interface designed for short range transmissions. The heart of the Emlink1 is the XE1205 radio transceiver which gives the Emlink1 full bi-directional communication for its inputs, outputs, serial data and repeat functions. Cased in an IP65 rated enclosure the Emlink1 is designed for indoor and outdoor use.

Each Emlink1 has 2 input channels which can accept either an analogue input signal from 0 to 24V DC for remote monitoring or a digital signal set by 4 thresholds.

Outputs 1 & 2 are volt free relay contacts and can be configured to work in 3 modes, momentary, toggle and timed outputs with intervals from 1 second to 30 minutes. An option to pair its own input to output allows the Emlink1 to work as a timer as well as transmitting its status to other paired devices.

The third output can be switched between a tamper relay and a 3rd channel. In tamper mode the Emlink1 can monitor local and remote tamper switches, lost status update signal from remote units or report a paired input from a remote unit. When not used as a tamper circuit the third channel can function as a momentary volt free output.

Other features include a built in signal strength meter, site survey mode for the engineer to check signal strengths when installing units and a RS232 / RS485 serial interface for transmission of protocols Pelco P & D, Emlink and an open channel protcol.

Emlink1 Programming

Repeat Mode - Pairing

In this mode, briefly pressing the right switch of the Emlink1 transmits a pairing signal to another device. If the Emlink1 receives a pairing signal from another device, signal LED 6 will flash twice and the bottom 5 signal LED's will increment. Holding down the right switch for more than 3 seconds clears any previously paired devices from this channel. When pairing a Emlink1 repeat, all functions from the Emlink1 will be repeated. Up to 5 Emlink1 units can be repeated. Listed below is the LED states for repeat mode pairing.

Pair Data Channel	Flashing LED's	Static LED's
1 device Paired	Input 1 & 2 alternating to Output 1 & 2 LED's	Signal LED 1
2 devices Paired	Input 1 & 2 alternating to Output 1 & 2 LED's	Signal LED 2
3 devices Paired	Input 1 & 2 alternating to Output 1 & 2 LED's	Signal LED 3
4 devices Paired	Input 1 & 2 alternating to Output 1 & 2 LED's	Signal LED 4
5 devices Paired	Input 1 & 2 alternating to Output 1 & 2 LED's	Signal LED 5

RF Channel Selection

The Emlink1 has 7 RF channels and defaults to channel 5. Below is a list of all the channel numbers and there corresponding frequencies:

RF Channels	Flashing LED's	Static LED's
Channel 1 (433.32MHz)	None	Signal LED 1
Channel 2 (433.52MHz)	None	Signal LED 2
Channel 3 (433.72MHz)	None	Signal LED 3
Channel 4 (433.92MHz)	None	Signal LED 3 & 4
Channel 5 (434.12MHz)	None	Signal LED 4
Channel 6 (434.32MHz)	None	Signal LED 5
Channel 7 (434.52MHz)	None	Signal LED 6

Status / Signal LED's

Each input / output on the Emlink1 has a closely mounted status LED to indicate the channel is active. For the signal strength a strip of 6 LED's is mounted in the centre at the top of the Emlink1. A brief description of the status / signal LED's is listed below:

Signal LED's

The signal LED's have 2 meanings, when the display raises from the bottom upwards this indicates a received signal strength, depending on the receive level will depend on how many LED's will light. For a transmission the LED's will pulse from the centre outwards.

Inputs / Outputs 1 & 2

The input / output LED's for channels 1 & 2 flash at half second intervals when a channel is active.

Channel 3 / Tamper

The status LED flashes at half second intervals providing the tamper fault is local, if a remote tamper fault has been detected the status LED will pulse twice. When using this output as a third channel the status LED will only flash at half second intervals when active.

Data Channel (Data Models Only)

The status LED on the data channel emits a short pulse when sending or receiving data over the RS232 or RS485 port. If the status LED stays on continuously for half a second or more there is a problem with either the serial port settings or the protocol used.

Power Saving

During continuous data transmission it will be noticed that the status / signal LED's will dim, this is a normal behaviour to save power. The status LED's will also extinguish when the tamper switch is held down for more than 5 seconds.

Emlink1 Programming

Data Channel - Protocol Continued

Listed below is the LED states for the data channel protocol.

Protocol	Flashing LED's	Static LED's
Emlink Protocol	Data + Signal LED's 5 & 6	Signal LED 1
Pelco P & D	Data + Signal LED's 5 & 6	Signal LED 2
Open Protocol	Data + Signal LED's 5 & 6	Signal LED 3
Spare	NA	NA

Input Channels 1 & 2 - Transmit Pairing Signal

When input channels 1 or 2 are flashing, The Emlink1 is in "Send Pairing Signal" mode. By briefly pressing the right button the signal LED's will flash a TX signal (Flashing from middle outwards) to send the pairing signal to another Emlink1 device. The receiving device will flash its signal LED 6 to indicate the reception of this pairing signal.

Send Pairing Signal	Flashing LED's	Static LED's
Pair Input 1 or 2	Input LED's 1 or 2	None

Input Channels 1 & 2 - Set Input Mode

Four possible modes are available (See Hardware Description) and are listed below:

Input 1 or 2 Mode	Flashing LED's	Static LED's
Self Sense N.0.	Input x + Signal LED 6	Signal LED 1
Self Sense N.C.	Input x + Signal LED 6	Signal LED 2
Positive Trig + 9V	Input x + Signal LED 6	Signal LED 3
Positive Trig + 18V	Input x + Signal LED 6	Signal LED 4

Note: Input x = Input LED 1 or 2

Emlink1 Programming

Tamper / Third Channel - Status Update Monitoring

Enable or disable status update monitoring. When enabled any missing status updates will generate a tamper fault and flash the tamper LED twice.

Status Update Monitoring	Flashing LED's	Static LED's
Disabled	Tamper + Signal LED 5	Signal LED 1 on
Enabled	Tamper + Signal LED 5	Signal LED 2 on

Tamper / Third Channel - Relay Test

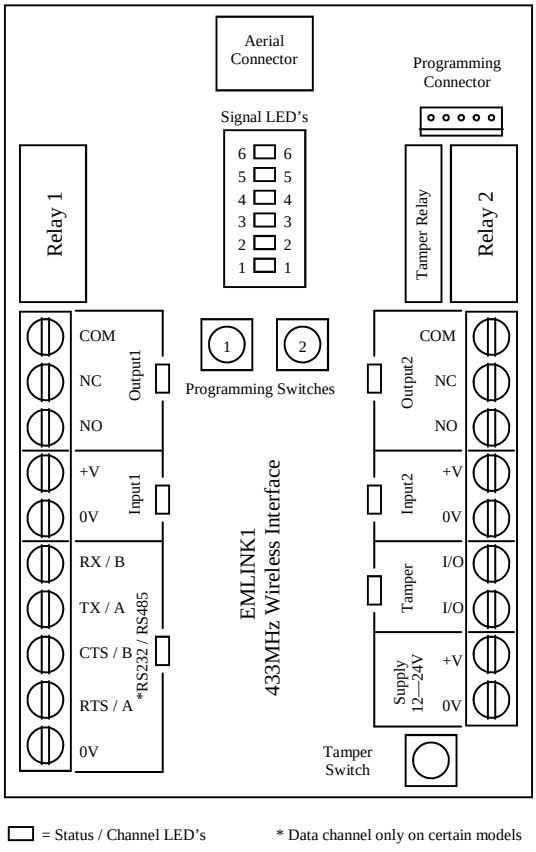
The Emlink1 has a build in relay test function. When the tamper and signal LED's 5 & 6 are flashing, pressing the right switch will turn on the relay and signal LED 1.

Status Update Period

Enabling the status updates forces the Emlink1 to transmit its status at a given period even if there are no input changes. If a receiving Emlink1 has its status update monitoring enabled and there is a loss of signal a tamper fault will be generated.

Status Update Period	Flashing LED's	Static LED's
Disabled	Tamper + Input 1 & 2 LED's	All Signal LED's off
1 Seconds	Tamper + Input 1 & 2 LED's	Signal LED 1 on
10 Seconds	Tamper + Input 1 & 2 LED's	Signal LED 2 on
30 Seconds	Tamper + Input 1 & 2 LED's	Signal LED 3 on
1 Minute	Tamper + Input 1 & 2 LED's	Signal LED 4 on
2 Minute	Tamper + Input 1 & 2 LED's	Signal LED 5 on
4 Minutes	Tamper + Input 1 & 2 LED's	Signal LED 6 on

Hardware Layout



Emlink1 Programming

Data Channel - Set Parity

In this mode, briefly pressing the right switch changes the parity for the RS232 / RS485 port. The parity must match the other communicating equipment's parity to function correctly. Listed below is the LED states for the different parity settings.

Parity	Flashing LED's	Static LED's
None	Data + Signal LED 5	Signal LED 1
Even	Data + Signal LED 5	Signal LED 2
Odd	Data + Signal LED 5	Signal LED 3

Data Channel -Protocol

In this mode, briefly pressing the right switch changes the selected protocol for the RS232 / RS485 port. Currently 3 protocols are available which are listed below:

1) Emlink protocol. This protocol is used for outputting all paired devices radio transmissions over either RS232 or RS485 port. It is also possible to control a paired Emlink1's outputs via this protocol. Typical uses for this is protocol are expander modules (Extra I/O channels) Reading of an Emlink1's analogue input voltages, status monitoring in software, door access control etc. Please refer to the programming guide.

2) Pelco P & D protocol. This is mainly used for CCTV telemetry. The Emlink1 automatically detects Pelco P or D and has built in support to pair Pelco AUX commands to any of the Emlink1's 3 outputs (See programming section).

3) Open protocol. This protocol has no input filtering and will transmit any data sent through the RS232 or RS485 lines. Care needs to be taken with the hardware connections to prevent the Emlink1 permanently transmitting data because of poorly connected cables. It is advisable to use the above protocols (Emlink & Pelco) if possible.

Additional Features

Status Updates

When an Emlink1's inputs change it automatically transmits an status update. This is a normal procedure but if the inputs do not change for a while the receiver does not know if the transmitter is still functioning correctly. To overcome this the Emlink1 can be programmed to transmit a status update at a given period. Status updates have 2 main functions:

1) If a receiver becomes out of sync with the transmitter i.e. a power cut, receiving automatic status updates will re-sync the receiver.
2) The receiver can also be programmed to detect missing status updates, if 2 or more status updates are missing the receiver generates a tamper fault and the tamper LED will flash twice to indicate a remote tamper fault.

To enable status updates please refer to the programming section.

Input channels analogue updates

When an Emlink1 transmits a status update it measures the input voltages and transmits this level as a digital value in 0.1V steps. The purpose of this feature is for remote data logging etc and has no affect on the inputs previously described.

Repeat Function

An Emlink1 can repeat other Emlink1's signals. The repeating Emlink1 still can use its own inputs and outputs while repeating other units. For an Emlink1 to repeat another units data it physically has to receive the first transmission and then re-transmit this on the same frequency. This is perfectly ok for status updates but for the data channel if a high data through put is required we cannot guarantee its operation.

RF Channel Selection

7 RF channel channels are available in the 433 - 434MHz band. All Emlink1 units must be on the same channel for them to communicate. If a particular channel is found to be poor it is advisable to try another channel

Hardware Description

Inputs 1 & 2

Listed below are the 4 modes of operation for Inputs 1 & 2:

Mode 1 - Self Sensing Normally Open Input

In this mode the Emlink1 outputs a sensing pulse to check to see if there is a open or short circuit present. Idle state would be represented by an open circuit where an active state would represented by a short circuit. Typical examples would be a open collector output from an alarm panel etc.

Mode 2 - Self Sensing Normally Closed Input

In this mode the Emlink1 outputs a sensing pulse to check to see if there is a open or short circuit present. Idle state would be represented by an short circuit where an active state would represented by a open circuit. Typical examples would be a magnetic door contact or a PIR sensor

Modes 3 & 4 - Positive Trigger (either 9 or 18 volts)

Modes 3 & 4 accept positive voltages from 0 to 24V DC from an external source. For digital switching, voltages over 9V (Mode3) or 18V(Mode 4) switch the Emlink1 into an active (triggered) state.

Emlink1 Programming

Tamper / Third Channel -Pairing

In this mode, briefly pressing the right switch of the Emlink1 transmits a pairing signal to another device. If the Emlink1 receives a pairing signal from another device, signal LED6 will flash twice and the bottom 5 signal LED's will increment by 1. Holding down the right switch for more than 3 seconds clears any previously paired devices from this channel. It is only possible to pair a data channel with another data channel. Listed below is the LED states for the data channel pairing.

Pair Data Channel	Flashing LED's	Static LED's
1 device paired	Tamper LED only	Signal LED 1
2 devices paired	Tamper LED only	Signal LED 2
3 devices paired	Tamper LED only	Signal LED 3
4 devices paired	Tamper LED only	Signal LED 4
5 devices paired	Tamper LED only	Signal LED 5

Tamper / Third Channel - Local Tamper Switch

Enable or disable local tamper switch. This does not affect the local switches state being transmitted to other Emlink1 interfaces. The options are as follows:

Tamper Switch	Flashing LED's	Static LED's
Disabled	Tamper + Signal LED 6	Signal LED 1 on
Enabled	Tamper + Signal LED 6	Signal LED 2 on

Emlink1 Programming

The Emlink1 is configured by a software menu system using the status and signal LED's to show the currently selected options. When in configuration mode the currently selected option is shown by 1 or more LED's pulsing twice and the currently selected parameter is shown by one or more of the signal LED's 1 - 4.

To Enter configuration mode hold down switches 1 & 2 for 3 seconds. Once 3 seconds has elapsed all of the Emlink1's LED's will flash 3 times. Depending if you are using a data or non data unit the first option will be the data channel or the input1 channel. For this manual we will assume a data unit is being used.

While in configuration mode, switches 1 - 3 work as follows:

- Switch 1 changes the current menu's option
- Switch 2 changes the currently selected parameter
- Pressing switch 1 for 3 seconds will save all new settings, flash all of the Emlink1 LED's twice and reboot the system.
- Pressing the tamper switch for 5 seconds exits configuration mode and switches off all LED's without saving new settings.

Pairing an Input to an output

To pair an input to an output is as follows:

1. Place both Emlink1's in configuration mode
2. Select an output channel to pair (1st Emlink1)
3. Select an input channel you wish to pair from (2nd Emlink1)
4. On the 2nd Emlink1 press the right button. The 1st Emlink1's signal LED 6 should flash twice and the signal LED's 1 - 5 should increment.
5. Save configuration by holding down switch 1 for 3 seconds
6. Test the connection by pressing the input channel switch for half a second and make sure the second box responds.
5. Pairing complete!

Emlink1 Programming

Data Channel - Pairing

In this mode, briefly pressing the right switch of the Emlink1 transmits a pairing signal to another device. If the Emlink1 receives a pairing signal from another device, signal LED6 will flash twice and the bottom 5 signal LED's will increment by 1. Holding down the right switch for more than 3 seconds clears any previously paired devices from this channel. It is only possible to pair a data channel with another data channel. Listed below is the LED states for the data channel pairing.

Pair Data Channel	Flashing LED's	Static LED's
1 device paired	Data LED only	Signal LED 1
2 devices paired	Data LED only	Signal LED 2
3 devices paired	Data LED only	Signal LED 3
4 devices paired	Data LED only	Signal LED 4
5 devices paired	Data LED only	Signal LED 5

Data Channel - Set Baud Rate

In this mode, briefly pressing the right switch changes the baud rate from 2400 to 19200 for the RS232 / RS485 port. The baud rate must match the other communicating equipment's baud rate to function correctly. Listed below is the LED states for the different baud rates.

Baud Rate	Flashing LED's	Static LED's
2400 Baud	Data + Signal LED 6	Signal LED 1
4800 Baud	Data + Signal LED 6	Signal LED 2
9600 Baud	Data + Signal LED 6	Signal LED 3
19200 Baud	Data + Signal LED 6	Signal LED 4